

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Selected Speeches and News Releases

May 4 - May 11, 1989

IN THIS ISSUE:

Statement—

Prepared for delivery by Secretary of Agriculture, Clayton Yeutter,
before the House Committee on Agriculture, May 10.

News Releases—

USDA Issues Permit to Field Test Genetically Altered Cotton Plants

USDA Announces Prevailing World Market Price for Upland Cotton

USDA Announces 1989 Crop Honey Price-Support Program

USDA Sets Producer Assessments for Dark Air, Fire, and Sun-Cured
Tobaccos

USDA Approves First Field Tests for Genetically Engineered Soybeans

USDA Announces Prevailing World Market Rice Prices

FGIS to Update NIR Calibration for Hard Red Winter Wheat

Beneficial Fungi Team Up With Corn to Eat Bad Fungi

Scientists Want to Give Plant Diseases Anemia

11-16-89
SOS

Statement

U.S. Department of Agriculture • Office of Information

Prepared for delivery by Secretary of Agriculture, Clayton Yeutter, before the House Committee on Agriculture, May 10.

Mr. Chairman and members of the committee, it is a privilege to appear before this committee to discuss the general state of U.S. agriculture. I would also like to include the prospects for agriculture in the near future and offer my views on future farm policy that will sustain agriculture's recovery.

Much of the turnaround seen in U.S. agriculture in recent years has been due to sustained economic growth at home and abroad. Overall, prospects for the U.S. and world economies favor continued recovery for agriculture. World economic growth is expected to approach 3 percent in 1989, keeping foreign demand for U.S. agricultural products strong. The U.S. economy is also expected to continue growing at about 3 percent, the seventh straight year of expansion. Other key U.S. economic indicators will generally be favorable: inflation may rise some but still be 4-5 percent, while unemployment will remain low at 5-5.5 percent. Although the value of the dollar could rise slightly, it is 30 percent below the 1985 peak and will not erode competitiveness of U.S. products.

There are some problem areas that are of concern to agriculture, including increased global inflation, continued heavy debt burdens by developing countries and the rise in U.S. interest rates. We must avoid world economic instability by following sound economic policies both at home (such as reducing the budget deficit) and abroad (such as cooperating with the Group of Seven). Continued strong economic performance at home and abroad will be the single most important determinant of demand for U.S. farm products.

Current Agricultural Situation and Outlook

The agricultural economy is continuing to make real progress in recovering from the severe economic and financial distress of the early to mid-1980's. Agricultural exports in FY 1988 were \$35.3 billion, up \$9 billion from 1986. This improvement corrected about one-half the drop which had occurred over the 1981 to 1986 period. In quantity terms,

1988 exports exceeded the 1986 level by over one-third. Net cash farm income was a record \$58 billion in 1988, just above the prior record 1987 level. After five years of decline, land values increased by 3 percent in 1987 and by 6 percent in 1988. Total farm debt has been reduced by over \$50 billion since 1983. Clearly, the economic recovery in agriculture has been significant although some problems and uncertainties remain.

The recovery is also reflected in better financial conditions for farm lenders. Prospects for the Farm Credit System have improved and loan volume is projected to increase in 1989 after a decline of about 40 percent since 1982. Most commercial farm lenders reported stronger loan portfolios in 1988 with declines in the number of delinquent accounts, write-offs and foreclosures. The number of farm bank failures declined from 75 in 1987 to 41 in 1988.

The turnaround has been facilitated by changes in government programs to allow more competitive pricing of U.S. farm products in world trade. Expanded exports have been a major factor in reducing surplus stocks and increasing commodity prices. Stronger markets through competitive pricing have led to lower farm program costs over the past couple of years.

The 1988 drought, which reduced production of several major crops, including feed grains, soybeans and wheat has also affected the farm financial situation. Reduced supplies have substantially boosted most crop prices. The higher prices have helped maintain a high cash income level for those farmers with supplies to sell and for the sector as a whole.

However, the drought dealt a severe financial blow to many producers who lost much of their crop and who did not have prior-year crops to sell. It also placed a heavy burden on livestock, poultry and dairy producers who were faced with higher feed costs. Special drought assistance and federal crop insurance payments softened the impact significantly for many of those who were hurt by the drought.

Despite the problems caused by drought losses, the total number of financially vulnerable commercial farmers has declined. About 5 percent of our farm businesses were financially vulnerable (with debt/asset ratios over 40 percent and negative net farm income) at the beginning of 1988.

This was a dramatic improvement from 2 years earlier when about 10 percent of U.S. farms were so categorized. However, there are still a substantial number of financially vulnerable farms. Many of these are Farmers Home Administration borrowers. Those farmers with prospects

for recovery will be assisted through write-downs and other servicing actions.

Outlook for 1989

U.S. crop supplies are smaller this year since the drought and acreage reduction programs in 1988 combined to reduce crop production. However, meat output will likely be up due to increases in poultry. Consumers should have ample food supplies at only moderately higher prices, which are expected to be up about 3 to 5 percent in 1989.

In order to assure adequate supplies to maintain our position as a reliable supplier in the world market, acreage reduction requirements were lowered for several key crops in 1989. Roughly one-half of the 54 million acres held out of production in 1988 under annual program provisions is available to be brought back into production in 1989. In March, U.S. farmers indicated plans to plant 6 million more acres of corn, 9 million more wheat and 3 million more soybeans. Crop production levels in 1989 may be up sharply due to expanded acreage and increased yields. The USDA will release its first supply and demand estimates for 1989 crop markets on May 11.

Of chief concern at the moment is the U.S. winter wheat crop. Prospects for Kansas, the leading wheat producing state, are dim as nearly 90 percent of the crop is currently rated poor to very poor. We have announced several measures to deal with drought-affected crops, including emergency haying and grazing on land idled under annual farm programs and emergency feed assistance programs. Also, we are making farmers aware of the 0-92 option. And, we are selling hay produced on eligible FmHA inventory property. Requests for assistance from states will be dealt with quickly. These measures will not restore lost production, but they will help drought-stricken farmers, particularly livestock producers who are in greatest need at this point.

Tighter supplies until the 1989 crop is harvested are reducing the physical volume of exports somewhat this year but higher prices should more than offset the volume reduction. Agricultural exports are projected to rise to about \$38 billion in FY 1989 compared with \$35.3 billion last year. The export outlook, of course, will be sensitive to supply developments both in the United States and overseas over the coming months. Low U.S. wheat stocks, uncertainty over the 1989 crop and more competitive U.S. prices in the world wheat market suggest a period

of more cautious use of the export enhancement program (EEP). We are using this period to review all aspects of the EEP. However, we remain fully committed to the fundamental objectives of the EEP, which has helped maintain our share of world agricultural trade and is providing leverage in the Uruguay Round. The longer term outlook for exports will depend on our success in GATT as well as on general economic conditions.

Farm production expenses are likely to increase moderately in 1989, particularly since crop acreage will expand. Energy-based inputs and feed costs may rise the most. Larger expenses and slightly lower government payments will very likely cause a decline in net cash farm income to perhaps \$48-52 billion in 1989, as compared to the record \$58 billion in 1988.

At present, it appears the financial position of farmers in 1989 will be favorable. Land and other asset values could rise modestly in 1989. Farm debt may also expand very slightly in 1989.

With more land going back into production in 1989, business activity in rural and nonfarm agriculturally dependent businesses is likely to expand. This will further boost economic recovery in the nonfarm sectors of the agricultural economy which were depressed along with the farm sector earlier in the decade. However, the farm financial crisis of the 1980's coupled with the 1988 drought and other adversities have had the effect of forcing rural areas to realize that economic security lies in diversification.

Many rural communities are now looking for ways to rebuild their economies and become less dependent on agriculture as their predominant economic base. Local leadership and initiative is the key to this effort. Without these ingredients most efforts will not be successful.

The department will continue to play a role in assisting small communities and rural areas, even though budget constraints have forced reductions in the programs which provide financial assistance to such areas. Continuing this commitment will be crucial as rural areas develop new approaches to deal with the economic realities facing them.

Future Farm Policy

Under the 1985 Farm Bill, the United States has made significant progress in moving towards a more market-oriented agriculture. This move has helped expand markets, improve farm income and reduce

federal outlays. The Uruguay Round of multilateral trade negotiations provides the opportunity for greater access to overseas markets and further export expansion. We now have the best chance ever to obtain major agricultural trade reforms on a worldwide basis and we ought to give it our best shot. If we have any confidence in our agricultural productivity—and I do—this exercise should be our highest priority over the next 19 months.

It is important for the next farm bill that we legislate carefully and skillfully. We should enact a farm bill that serves the fundamental needs of American agriculture as delineated in the 1985 Farm Bill, while also hopefully enhancing our leverage at the negotiating table. Negotiating leverage was not a major concern in the 1985 legislation, of course, because the 1985 Act predated the Uruguay Round.

Three weeks ago today, I appeared before the Senate Agriculture Committee and discussed my views on the Uruguay Round and the 1990 Farm Bill. I would like to summarize those views for this Committee. If the Uruguay Round is successful, we will need to modify the 1990 Farm Bill accordingly—probably sometime during 1991. Will we then be writing the 1991 Farm Bill in Geneva? To some degree perhaps, but only if we believe it is in the best interest of American agriculture to do so.

If the Geneva negotiations are successful we'll also be writing a segment of the European Community's 1991 Farm Bill in Geneva, rather than in Brussels. That is obviously one of our objectives. And we'll also be writing a major segment of the farm bills of Canada, Brazil, Argentina, Australia and several other countries in Geneva; we want to do that too. If we wish to have an impact on the farm bills of other nations, it would be unrealistic to expect the negotiations to have no effect on our own legislation. What we must seek is a balanced outcome beneficial to all.

Permit me now to be somewhat more specific with respect to the forthcoming legislation. One of our objectives next year should be to reduce the rigidity of our present programs. Farmers want and deserve more flexibility. If properly designed, additional program flexibility should result in increased economic efficiency and long-term benefits to farmers and to our society.

We should also reconsider target price relationships. Those relationships presently tilt toward the production of certain crops and against the production of others. There is no evident economic rationale for this and the distortions have hurt us in the marketplace—soybeans and

oats, for example. We in the administration will focus on this issue in the coming weeks and we'll have recommendations for you later in the year.

The farmer-owned reserve and CCC-stocks have helped to moderate the effects of production variability here and abroad. But too often, farmers have produced for government-financed storage rather than for markets. It has been easy to accumulate stocks under government programs; it has been difficult to release them.

Stocks are needed to cushion unanticipated production shortfalls. However, we need to reexamine our reserve and CCC inventory policies to determine how large stocks should be, how they should be financed, and how their release to the market can be encouraged when supplies tighten.

The potential cost of these programs will be an important element of your deliberations and mine over the coming months. We must find ways of saving money without unilaterally disarming in the international marketplace. Some have suggested that we do so by raising loan rates but that would be penny-wise and pound foolish. Our competitors would be ecstatic if we were to make that mistake again! The thrust of the 1985 Farm Bill was to regain market share. We've worked hard at that and we've had considerable success. It would be tragic to throw away all that progress by setting loan rates at levels that will stimulate competitive production all over the world.

For those same reasons, we should look askance at saving money through large annual acreage reduction programs. Our competitors love seeing those acres out of production! Acreage reductions clearly work to their advantage; one must seriously question whether they work to ours.

We do need to evaluate the "safety net" element of our present programs. Are we providing a safety net where it really isn't necessary? If so, how can we remove it in those situations? Is there a feasible way to pinpoint income supports with greater precision than in the past? These questions have been raised in recent years but have not yet been answered satisfactorily. We ought to try again in the coming months.

And, we certainly ought to avoid the chaos and additional cost of supplementing crop insurance with emergency disaster programs. If we bail out disasters every year with special legislation, we'll never be able to make crop insurance work. If crop insurance has shortcomings (and I believe it does), let's try to fix them—in the 1990 Farm Bill or through separate legislation.

An eternal complaint from farmers is that price and income support

programs have become too complicated and administratively burdensome. They're right! I suspect that is partially attributable to the legislation and partially to the way it has been administered. It is my responsibility to control the latter and I intend to do so. You can make a contribution to the former and I hope you will in the 1990 legislation.

Aside from income support programs, the 1990 Farm Bill must devote considerable attention to environmental issues. This committee can deservedly take pride in the conservation provisions of the 1985 Act. The Conservation Reserve has already taken more than 28 million acres of highly erodible land out of production and that is a major achievement. We estimate that this program alone is reducing soil losses by 300 million tons per year compared to the early 1980's and we'll be able to do more as we move toward a goal of 40 million acres in the program. The Conservation Reserve is, however, costly and with our current tight supplies we need to investigate ways to achieve similar conservation goals with other tools as well.

Requiring on-the-farm conservation plans as a condition to participation in income support programs was a major advancement too, and it will pay important conservation dividends in the future, as will the Sodbuster and Swampbuster provisions.

However useful these new conservation tools may be, we must recognize that so long as we provide income support through commodity price support programs there will be a tremendous stimulus for farmers to produce. Generating huge surpluses not only costs taxpayers large sums of money but it may have adverse environmental consequences as well—in levels of soil erosion and in ground water quality, for example. If we are to have an environmentally sustainable agricultural production system over the long pull, we must find ways to diminish gradually the nexus between income supports and production levels.

I will expect the Department of Agriculture to be sensitive to environmental and other intergenerational concerns during my tenure and to balance those interests carefully and sensibly.

Finally, it is obvious that we will all have to devote more attention to food safety in the months ahead. You and I know that we have the world's safest food supply but we must communicate that to the American public and we must be credible. That should be done through information and education, not via the scare tactics that have permeated the media in recent weeks. Educational efforts are not always glamorous but they are the heart of a democratic society. We'll assess whether any

additional legislative authority would be useful in meeting this challenge.

I look forward to working with the committee in the development of 1990 farm legislation. It would be advantageous for everyone to have this bill passed as early as possible—even this year if we could.

#

News Releases

U.S. Department of Agriculture • Office of Information

USDA ISSUES PERMIT TO FIELD TEST GENETICALLY ALTERED COTTON PLANTS

WASHINGTON, May 4—The U.S. Department of Agriculture is issuing a permit to the Monsanto Agricultural Company of St. Louis, Mo., to conduct a limited field test of cotton plants genetically engineered to be tolerant of the herbicide glyphosate.

The field test will be conducted in Baldwin County, Ala., beginning in late May and extending through the summer. It is the first field trial of genetically engineered plants to be conducted in Alabama and the second field trial in the United States involving genetically engineered cotton.

“With this new cotton plant, producers could complete all their weed control using a single herbicide that is safe for their crop,” said James W. Glosser, administrator of the USDA’s Animal and Plant Health Inspection Service. Cotton producers often use herbicide mixtures to kill different types of weeds. The crop is susceptible to damage by some of the chemicals used.

APHIS has prepared an environmental assessment reviewing the scientific methods and data involved in this test. “We are satisfied that the tests are well designed and are not environmentally hazardous,” said Glosser.

Monsanto scientists inserted a gene from a petunia into cotton to develop the new herbicide-tolerant cotton. Researchers will examine the performance of the altered plants for quantity and quality of cotton lint as well as herbicide resistance to determine potential marketability.

Copies of the environmental assessment and finding of no significant impact are available by contacting Linda Gordon, USDA, APHIS, BBEP, Room 843-A Federal Building, 6505 Belcrest Road, Hyattsville, Md., 20782; telephone (301) 436-7612.

Anita Brown (301) 436-7799

#

USDA ANNOUNCES PREVAILING WORLD MARKET PRICE FOR UPLAND COTTON

WASHINGTON, May 4—Under Secretary of Agriculture Richard T. Crowder today announced the prevailing world market price, adjusted to U.S. quality and location (adjusted world price), for Strict Low Middling (SLM) 1-1/16 inch (micronaire 3.5-4.9) upland cotton (base quality) and the coarse count adjustment in effect from 12:01 a.m. Friday, May 5, through midnight Thursday, May 11.

Since the Adjusted World Price (AWP) is above the 1987 crop and 1988 crop base quality loan rates of 52.25 and 51.80 cents per pound, respectively, the loan repayment rate for 1987 crop and 1988 crop upland cotton during this period is equal to the respective loan rates for the specific quality and location.

Because the loan repayment rate for 1988 crop upland cotton in effect during this period is above the established loan rate, loan deficiency payments are not available for 1988 crop upland cotton sold during this period.

The AWP will continue to be used to determine the value of upland cotton that is obtained in exchange for commodity certificates.

This period represents Week 3 of the 6-week transition period from using current shipment prices to using forward shipment prices in the AWP calculation. The procedure was adopted to avoid a dramatic change in the AWP that could occur with no transition period, due to differences between new and old crop price quotes.

For Week 3 and Week 4, the Northern Europe price = (Northern Europe current price + Northern Europe forward price)/2. Similarly, the Northern Europe coarse count price = (Northern Europe coarse count current price + Northern Europe coarse count forward price)/2. In calculating the adjustment to average U.S. spot market location, Thursday's current shipment prices for U.S. Memphis territory and the California/Arizona territory as quoted for Middling 1-3/32 inch cotton C.I.F. northern Europe were used.

Based on data for the week ending May 4, the AWP for upland cotton and the coarse count adjustment are determined as follows:

Adjusted World Price	
Northern Europe Price	74.23
Adjustments:	
Average U.S. spot market location	12.05
SLM 1-1/16 inch cotton	2.00
Average U.S. location	0.42
Sum of Adjustments	-14.47
ADJUSTED WORLD PRICE	59.76 cents/lb.

Coarse Count Adjustment	
Northern Europe Price	74.23
Northern Europe Coarse Count Price	-69.07
	5.16
Adjustment to SLM 1-inch cotton	-4.15
COARSE COUNT ADJUSTMENT	1.01 cents/lb.

The next AWP and coarse count adjustment announcement will be made on May 11.

Charles Cunningham (202) 447-7954

#

USDA ANNOUNCES 1989 CROP HONEY PRICE-SUPPORT PROGRAM

WASHINGTON, May 4—Under Secretary of Agriculture Richard T. Crowder today announced that the average 1989 honey price-support loan rate will be 56.36 cents per pound. Price support will be available only by means of nonrecourse loans, and purchase agreements will not be offered.

Following are extracted honey loan rates for color and class:

Color and/or class	Cents per pound
Table	
White	57.93
Extra-light amber	54.93
Light amber	53.93
Amber	52.93
Nontable	50.93

Loans will be offered on 1989-crop honey in eligible containers for on or off-farm storage. Producers will have until next March 31 to request a honey price-support loan.

Producers with honey price-support loans may repay their 1989-crop honey loans at levels less than the price-support loan rates. These rates will be established at levels that will minimize loan forfeitures, reduce honey stocks and storage costs, and maintain the competitiveness of domestic honey in U.S. and export markets. These lower repayment rates will be announced weekly.

John C. Ryan (202) 447-6788

#

USDA SETS PRODUCER ASSESSMENTS FOR DARK AIR, FIRE, AND SUN-CURED TOBACCOS

WASHINGTON, May 5—The U.S. Department of Agriculture announced today that to qualify for price support loans under the tobacco program, producers of 1989-crop Kentucky and Tennessee dark air-cured, types 35 and 36, firecured, types 22 and 23, Virginia fire-cured, type 21, or sun-cured, type 37, tobaccos must agree to pay assessments on all marketings of these tobaccos for deposit into no-net-cost accounts.

The assessments ensure the tobacco price support program will be operated at no-net-cost to taxpayers as required by the No Net Cost Tobacco Program Act of 1982.

The assessments are 2 cents per pound for Virginia fire-cured, type 21, and sun-cured (type 37), 2 cents per pound for fire-cured, types 22 and 23, and 6 cents per pound for dark air-cured, types 35 and 36, tobaccos. The amounts were determined in consultation with tobacco producer associations.

Producers who elect not to pay the assessments will not be eligible for price support loans on those crops. In addition, for each pound of these tobaccos they sell, they will be assessed a penalty equal to 75 percent of the 1988 average market price for the tobacco, the same penalty that applies to the marketing of excess tobacco.

Bruce F. Merkle (202) 447-6787.

#

USDA APPROVES FIRST FIELD TESTS FOR GENETICALLY ENGINEERED SOYBEANS

WASHINGTON, May 8—The U.S. Department of Agriculture has issued a permit to Monsanto Agricultural Company, St. Louis, Mo., for the first field testing of a genetically engineered soybean variety.

The new variety is expected to exhibit glyphosate tolerance. Glyphosate is a herbicide also known by the trade name of “Roundup.” Testing begins this month and will continue through summer at sites in Jerseyville, Ill., Whiteville, Tenn., and Stuttgart, Ark.

“Glyphosate tolerance in soybeans would offer new production possibilities to American farmers,” said James W. Glosser, administrator of USDA’s Animal and Plant Health Inspection Service. “A single herbicide could be used without fear of damaging the crop, rather than the mixtures and multiple applications now necessary.” Soybeans are a major field crop, worth \$12 billion to American agriculture in 1988.

APHIS has evaluated the scientific data and methods to be used in these trials and finds the tests to be well designed and environmentally safe.

Monsanto scientists engineered the new soybean variety by identifying and “borrowing” a gene that occurs in petunias. In greenhouse studies, transferring the petunia gene to soybeans has made the crop tolerant of the herbicide glyphosate. The researchers now want to test the performance of the new variety under field conditions.

A copy of the environmental assessment prepared by APHIS is available from Linda Gordon, USDA, APHIS BBEP, Room 843A, Federal Building, 6505 Belcrest Road, Hyattsville, Md. 20782; telephone (301) 436-5961.

Anita Brown (301) 436-7799

#

USDA ANNOUNCES PREVAILING WORLD MARKET RICE PRICES

WASHINGTON, May 9—Under Secretary of Agriculture Richard T. Crowder today announced the prevailing world market prices of milled rice, loan rate basis, as follows:

—long grain whole kernels, 11.41 cents per pound;

- medium grain whole kernels, 10.69 cents per pound;
- short grain whole kernels, 10.60 cents per pound;
- broken kernels, 5.71 cents per pound.

Based upon these prevailing world market prices for milled rice, rough rice world prices are estimated to be:

- long grain, \$7.05 per hundredweight;
- medium grain, \$6.69 per hundredweight;
- short grain, \$6.37 per hundredweight.

The prices announced are effective today at 3:00 P.M. EDT. The next scheduled price announcement will be made May 16 at 3:00 P.M. EDT, although prices may be announced sooner if warranted.

Gene Rosera (202) 447-7923

#

FGIS TO UPDATE NIR CALIBRATION FOR HARD RED WINTER WHEAT

WASHINGTON, May 9—The U.S. Department of Agriculture's Federal Grain Inspection Service next week will begin installing an updated calibration in official near-infrared-reflectance (NIR) instruments for determining protein content of hard red winter wheat.

The calibration is a series of mathematical constants that, when programmed into an NIR's electronic memory, enable the instrument to determine protein levels with an accuracy equivalent to the Kjeldahl laboratory method.

At the time that the calibration is implemented, new NIR values for the National Standard Reference Samples will be issued for the entire set of 10 samples. The samples are used to correct instrument drift, thereby keeping the NIRs aligned with the Kjeldahl protein laboratory at the FGIS Research Center in Kansas City, Mo.

The new calibration was developed with the assistance of the Instrumentation Research Laboratory of USDA's Agricultural Research Service and the Statistics Branch of USDA's Agricultural Marketing Service.

Beginning Monday, May 15, the new calibration will be implemented in FGIS field offices and the official agencies in their circuits in the following sequence: Wichita, Kan., and Moscow, Idaho; Kansas City, Mo., St. Louis, Mo., and Omaha, Neb.; Grand Forks, N.D., Duluth,

Minn., and Minneapolis, Minn.; Beaumont, Corpus Christi, Galveston, Pasadena and Plainview, Texas, and Belle Chasse, Destrehan and Litcher, La.; Olympia, Wash., Portland, Ore., and Sacramento, Calif.

“A technical review of the new calibration indicates that the effect on the national system will be minimal,” said Gail Jackson, director of FGIS’ Quality Assurance and Research Division. “However, the precise impact of the updated calibration at any given location cannot be predicted accurately.”

To assure that the updated HRW calibration accurately measures protein content of new varieties, FGIS plans to update the calibration annually using a five-year rollover of data. FGIS last updated NIR calibrations for hard red winter wheat in 1988.

Official notification of the updated calibration will appear in the May 11 Federal Register.

For more information, contact Lewis Lebakken Jr., USDA, FGIS, Resources Management Division, Room 0628-S, P.O. Box 96454, Washington, D.C. 20090-6454; telephone (202) 475-3428.

Allen Atwood (202) 475-3367

#

BENEFICIAL FUNGI TEAM UP WITH CORN TO EAT BAD FUNGI

WASHINGTON, May 10—Stalk rot fungi, which cost U.S. corn farmers about a half-billion bushels a year, become victims themselves when corn is sprayed with beneficial fungi, a U.S. Department of Agriculture scientist has reported.

Entering and living inside the corn plant, the good fungi—a naturally occurring type—make the rot fungi sick by eating away at them.

“The research stirs hope for countering stalk rots with a biological control scheme that would be inexpensive, environmentally safe and applicable to farms throughout the world,” said plant pathologist Nader G. Vakili of USDA’s Agricultural Research Service.

In field plots, he sprayed spores of *Melanospora damnosa* on foliage of inbred corn lines for four years. In the first year, *M. damnosa* infected only about one-half of one percent of the stalk rot fungus, *Fusarium moniliforme*, in the stalks. But after five years, 50 - 80 percent were infected, because applications of the good fungi steadily built up in the

field, said Vakili, of the ARS Cereal and Soybean Improvement Research Unit, Ames, Iowa.

In another study, one corn line protected by *M. damnosa* had yields as much as 65 percent higher than a line lacking this beneficial fungus.

The results, he said, suggest a package plan for biocontrol. "Strains of biocontrol fungi would be picked for compatibility with a given corn line, and the corn would be bred to support large numbers of these fungi," he said.

The payoff could be big. "In the United States alone," he said, "stalk rots reduce yields by some 500 million bushels annually." Quality suffers too, he added. As weak cornstalks fall, the ears touch the ground and deteriorate.

Vakili presented his findings this week at the 14th annual symposium sponsored by the ARS Agricultural Research Center in Beltsville, Md. The topic this year is the rhizosphere, the zone of soil surrounding plants.

The beneficial fungi, or mycopathogens, naturally coexist with stalk rot fungi in the soil and in corn plant debris, he said. In the soil, the rot fungi—some infected by the good fungus—invade germinating seeds and roots. Rain striking the soil may splash both fungi onto leaves, where *Fusarium* enters the plant, sometimes carrying hitchhiking mycopathogens.

While scientists have known about the mycopathogens for decades, about five years ago Vakili was the first to find them living inside corn plants. He later learned that their numbers were related to compatibility of genetic strains of both fungi and corn.

He said successful biocontrols for stalk rot and other diseases of grains may come through further studies of complex three-way relationships between genetic strains—or genotypes—of plants, disease fungi and beneficial fungi.

He found inspiration for his latest research by observing farmers grow open-pollinated corn in Honduras, El Salvador and Guatemala. There, he saw stalks healthy and strong enough to support two and even three accompanying crops of pole beans each year.

He reasoned from this that tropical corn varieties might favor the growth of the beneficial fungi, which in turn defended them against diseases that would weaken the stalks.

"Some modern corn genotypes developed from tropical ancestors should still express this control mechanism to varying degrees," he said.

“And as the desired corn genes are identified, they may become valuable to breeders.”

But, he added, large acreages of higher-yielding hybrids are supplanting open-pollinated corn to feed growing human populations in the tropics.

“That could mean more fungal disease will show up. It also means that new hybrids to support biocontrol of stalk rot could be especially important in those areas,” he said.

Ben Hardin (309) 685-4011

#

SCIENTISTS WANT TO GIVE PLANT DISEASES ANEMIA

WASHINGTON, May 11—Billions of dollars in crops are lost each year because microscopic organisms snuggle up to roots and infect plants with disease.

But Jeffrey S. Buyer and other researchers hope farmers and gardeners could someday make the bad microbes anemic—depriving them of iron by bolstering the soil with certain beneficial bacteria.

This could happen if scientists uncover and exploit new knowledge about intriguing iron-hoarding compounds. Buyer said “virtually all” bacteria and fungi—good and bad alike—produce the compounds to meet their own iron needs.

Buyer, a U.S. Department of Agriculture chemist, has come up with a new test he hopes will help lift the veil from the compounds, known as siderophores. They have long baffled scientists.

“Right now,” he said, “we have no good methods to study the compounds in their natural state or determine why they sometimes do and sometimes don’t help control disease organisms.”

That may change soon. Buyer and two colleagues at USDA’s Agricultural Research Service have produced and tested the first monoclonal antibody—a custom-built protein—that will seek out and bind to siderophores so they can be measured.

So far, the antibody method has only been tested with siderophores isolated from lab-grown bacteria. This summer, however, Buyer, microbiologist Lawrence J. Sikora and plant physiologist Marian Kratzke plan to see if the test will detect siderophores on roots of barley seedlings grown in a greenhouse at the Soil Microbial Systems Laboratory in Beltsville, Md.

Buyer spoke today at the 14th annual science symposium held this week at the agency's Beltsville Agricultural Research Center. The symposium's theme is the rhizosphere, the thin zone of soil surrounding plant roots.

Buyer said no one has exact figures for crop losses from soil diseases, but about 15 years ago a rough estimate set the U.S. figure at \$4 billion—about half the total crop loss to diseases and other pests.

He emphasized that more research and an effective delivery system—such as coatings for seed—would be needed before growers could protect their crops with siderophores.

And researchers' mixed results are evidence siderophores will not be a cure-all for plant disease.

Still, in this summer's experiments, Buyer plans further tests of a bacterium, *Pseudomonas putida* B10, that has shown some promise as a biocontrol for take-all, a major fungal disease in wheat. The fungus, *Gaeumannomyces graminis* var. *tritici*, causes lesions in the roots. Then, fungus strands invade the damaged roots, cutting off the plant's nutrient transport.

An effective biocontrol for take-all could save wheat farmers in the Northwest as much as \$38 million annually in crop losses. R. J. Cook, a plant pathologist who heads the ARS Root Diseases and Biological Control Research Laboratory in Pullman, Wash., has developed a strain of *Pseudomonas fluorescens* bacteria now being extensively tested as a potential commercial biocontrol for the disease.

As for *P. putida*, Buyer said "greenhouse experiments several years ago indicated that the bacterium suppresses take-all, and siderophores are the mechanism. They may be starving the fungus of iron." But, he added, researchers don't know a lot about how this happens.

"One of our goals is to determine what concentration of the bacterium's siderophores will get biocontrol, and under what conditions, such as the amount of water, the type of soil and its pH (acidity) and temperature," Buyer said.

Besides starving other microbes of iron, he said some siderophores may prevent plants from getting needed iron. Other plants may receive iron from siderophores.

"Siderophores vary widely. We know they have a low molecular weight, that they're not proteins," he said. "About the only other thing they have in common is that microbes make them take up iron from soil."

Among other experts speaking at the symposium are the discoverer of siderophores, J.B. Neilands of the University of California, Berkeley; two of the researchers who first showed siderophores could act as biocontrols, John Leong of the University of Utrecht, The Netherlands; and Joseph W. Kloepper of Auburn University in Alabama; and other ARS scientists.

At the ARS Horticultural Crops Research Laboratory, Corvallis, Ore., plant pathologist Joyce E. Loper, who spoke yesterday, is trying to find out why biocontrol by siderophores works only some of the time. Current studies focus on aerobactin, a type of siderophore. She said that until recently it had been found only in microorganisms infecting animals and humans.

But, she added, Carol A. Ishimaru, a plant pathologist who works with her, found aerobactin in a strain of *Erwinia carotovora* from an Oregon potato field. This bacterium causes several diseases in growing and stored potatoes and other crops. The researchers have been cloning genes from the aerobactin-producing strain. The cloning is to prepare for tests to find out if aerobactin is responsible for *carotovora*'s resistance to biocontrols.

Geneticist Linda S. Thomashow from the Pullman lab reported yesterday on tests with siderophores of a bacterial strain, *Pseudomonas fluorescens* 2-79, that controls take-all. Another Pullman researcher discovered the strain's biocontrol potential several years ago.

Until now, Thomashow said, researchers have thought that 2-79's siderophores—as well as an antibiotic it produces—were both major modes of action. From her new tests, which used 2-79 mutants that produced only the siderophores, she concluded that only the antibiotic has a major role in controlling take-all.

But, she added, researchers might get different results with other strains of *P. fluorescens*.

Jim De Quattro (301) 344-4296

#

